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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,105	04/13/2004	Shunsuke Kobayashi	CU-3682 RJS	4514

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EXAMINER	
HON, SOW FUN	

ART UNIT	PAPER NUMBER
1794	

MAIL DATE	DELIVERY MODE
02/21/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/823,105	KOBAYASHI ET AL.	
	Examiner	Art Unit	
	SOPHIE HON	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *8-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Rejections Withdrawn

1. The objection to claim 7, 35 U.S.C. 112, 2nd paragraph rejection of claim 1, 35 U.S.C. 102(b) rejection of claims 1, 3-6 as being anticipated by Yoshikawa, 35 U.S.C. 103(a) rejection of claim 7 over Yoshikawa in view of Asano, are withdrawn due to Applicant's cancellation of said claims.

2. The 35 U.S.C. 103 (a) rejection of claims 8-12 over Yoshikawa in view of Kobayashi, Asano and McKnight is withdrawn due to Applicant's arguments regarding McKnight.

New Rejections

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 8-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa (Frequency Modulation Response of a Tunable Birefringent Mode Nematic Liquid Crystal Electrooptic Device Fabricated by Doping Nanoparticles of Pd Covered with Liquid-Crystal Molecules, Japan Journal of Applied Physics, vol. 41) in view of Kobayashi (US 4,701,024), Asano (US 909,605) and Fujimura (US 4,836,654).

Regarding claims 8-9, Yoshikawa teaches liquid crystal-soluble particles dissolved or dispersed in the liquid crystal layer of a liquid crystal device element (liquid-crystal EO device, using a liquid crystal as a host medium called NLC1, where the device is doped with PD nano-

particles that are covered with other NLC molecules, L1315a, 2nd paragraph), wherein each of the liquid crystal-soluble particles comprises a core having a diameter of 2.5 nm (page L1315a, 3rd paragraph), that is within the range of smaller than 100 nm, and comprising a plurality of nanoparticles; and a protective layer comprising liquid crystal molecules is provided on the periphery of the core (core metal nanoparticles, page L1315a, 3rd paragraph), which renders the particle liquid-crystal soluble. Yoshikawa fails to disclose that the liquid crystal device element comprises: a pair of parallel substrates; conductive layers provided respectively on facing inner surfaces of these substrates; a pair of liquid crystal alignment layers provided respectively with pre-tilt angle on facing inner surfaces of the conductive layers; wherein the liquid crystal layer is formed between the pair of liquid crystal alignment layers.

However, Kobayashi teaches that a liquid crystal device element shown in Fig. 2A (cell, column 4, lines 30-34) comprises the basic elements of: a pair of parallel substrates (transparent plates 5, 6, column 4, lines 34-35); conductive layers provided respectively on facing inner surfaces of these substrates (electrodes 7 and 8 on the inner surfaces, column 4, lines 34-37); and a liquid crystal layer formed in between (liquid crystal molecules 3, column 4, lines 36-38), wherein metal particles (column 4, lines 66-68) are dispersed in the liquid crystal (column 6, lines 37-40), for the purpose of providing the liquid crystal with an effective switching function (column 5, lines 35-42). Kobayashi fails to teach that the liquid crystal layer is formed in between a pair of liquid crystal alignment layers formed on the facing inner surfaces of the pair of conductive layers, wherein the alignment layers are provided respectively with a pre-tilt angle.

However, Asano teaches a liquid crystal display device element wherein the liquid crystal layer is aligned between a pair of liquid crystal alignment layers (pair of substrates each having an alignment layer, column 2, lines 43-47), and wherein the liquid crystal alignment layers are provided respectively with a pre-tilt angle (column 3, lines 1-2), for the purpose of providing the desired pre-tilt angle to the liquid crystal (column 5, lines 43-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have formed the liquid crystal device element of Yoshikawa, by disposing the liquid crystal layer containing the liquid crystal-soluble metal core particles, in between a pair of liquid crystal alignment layers formed on the facing inner surfaces of a pair of conductive layers which are provided on the inner surfaces of a pair of parallel substrates, as taught by Kobayashi in view of Asano, wherein the liquid crystal alignment layers are provided respectively with a pre-tilt angle, in order to align the liquid crystal layer with the desired pre-tilt angle, as taught by Asano.

In addition, Yoshikawa teaches that voltage is applied across the electrodes of a pixel while modulating at least the frequency (drive this device by changing the frequency of the applied voltage across the electrodes of a pixel, L1317b, 1st paragraph), which indicates the presence of a control circuit for applying voltage while modulating the frequency, provided on the conductive layer for varying light transmittance of the liquid crystal layer, as evidenced by Kobayashi.

Kobayashi teaches that a liquid crystal device element has a control circuit for applying voltage on a conductive layer for varying light transmittance of the liquid crystal layer (circuit 27, transparent electrode 26, orientation state of the liquid crystal 23 will vary and a displaying function will be developed, column 7, lines 20-30, Fig. 12).

Yoshikawa, as modified by Kobayashi and Asano, fails to teach that an electro-optical response is turned on by switching the frequency of the applied electric field from low frequency to high frequency, and turned off by switching the frequency from high frequency to low frequency, or that a time constant of response concerning turning the electro-optical response on and off is in a range of 0.1 ms to 10 ms.

However, Fujimura teaches that a method of varying the light transmittance of a liquid crystal layer, is to turn on the electro-optical response by switching the frequency of the applied field from low frequency to high frequency, and to turn off the electro-optical response by switching the frequency from high frequency to low frequency (electrically controlled birefringent type liquid crystal device is turned on/off upon selective application of electric fields of two frequencies, i.e. high and low frequencies (column 4, lines 57-64), wherein a time constant of response concerning turning the electro-optical response on and off is in a range of 0.25 ms to 0.3 ms (column 23, lines 40-45), which is within the claimed range of 0.1 ms to 10 ms, for the purpose of providing the desired display (column 1, lines 5-10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used a method of varying the light transmittance of the liquid crystal layer in the liquid crystal element of Yoshikawa, where the electro-optical response is turned on by switching the frequency of the applied electric field from

low frequency to high frequency, and turned off by switching the frequency from high frequency to low frequency, and where a time constant of response concerning turning the electro-optical response on and off is within in a range of 0.1 ms to 10 ms, in order to provide the desired display, as taught by Fujimura.

Regarding claim 10, Yoshikawa teaches that the frequency modulation range of the electro-optical response is in a range of 20 Hz to 120 Hz (L1317b, 1st paragraph), that is within the claimed range of 20 Hz to 100 kHz.

Regarding claim 11, Yoshikawa teaches that the nanoparticle constituting the liquid crystal-soluble particle is at least one kind of metal atom selected from Pd (page L1315a, 2nd paragraph).

Regarding claim 12, Yoshikawa teaches that the liquid crystal device element is driven by using an active matrix mode (matrix driving, L1317b, 1st paragraph).

Regarding claim 13, Yoshikawa discloses in Fig. 1(c), shown below, that the short axis width of the liquid crystal molecule is equal to or less than the diameter of the core.

Response to Arguments

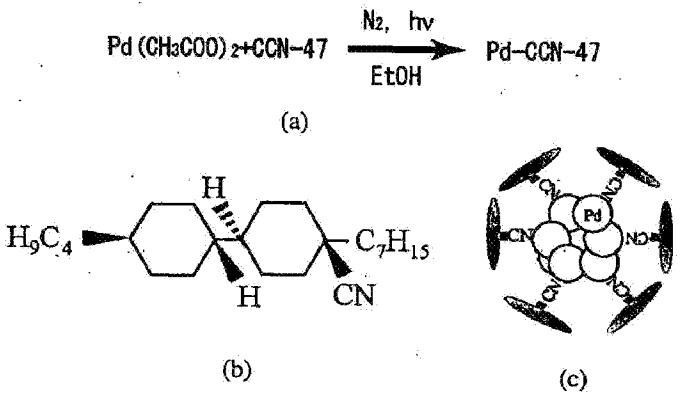

Fig. 1. Synthesising process of Pd-CCN-47 using an alcohol reduction method, where (a) is a chemical equation showing the synthesising process of Pd-CCN-47, (b) shows the CCN-47 chemical structure, and (c) illustrates the Pd-CCN-47 nanoparticles.

4. Applicant's arguments with respect to the valid use of McKnight have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number is (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris, can be reached at (571)272-1478. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sophie Hon/
Sow-Fun Hon

/Terrel Morris/
Terrel Morris
Supervisory Patent Examiner
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